Limiting Habitat Factors Analysis
WRIA 30 (Klickitat)

Executive Summary

Introduction

This limiting habitat factors analysis is conducted pursuant to RCW 75.46 (Salmon Recovery). The purpose of this analysis is "to identify the limiting factors for salmonids" where limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon." It is intended that the findings of this analysis be used by a locally-based habitat project selection committee to prioritize appropriate projects for funding under the state salmon recovery program; the analysis may also be used by local organizations and individuals interested in habitat restoration to identify such projects.

This first version of the LHFA is limited in its consideration to anadramous fish in the Klickitat Watershed only. The next version (anticipated completion early fall, 1999) will extend the analysis to fish-bearing streams in WRIA 31 (Rock/Glade), include consideration of bull trout (*Salvelinus confluentus*), and will incorporate new information on habitat, water quality, and forest practices that is anticipated to be released shortly.

Setting

WRIA 30 (Klickitat) consists of the Klickitat River watershed plus a number of small tributaries draining to the Columbia between the Klickitat watershed and the Rock Creek watershed to the east. These small tributaries are not known to be utilized by anadramous fish, and are excluded from this analysis.

The Klickitat River watershed encompasses an area of 1350 square miles. The landscape consists primarily of a plateau of volcanic origin dissected by canyons carved by the watershed's network of streams and rivers. The Klicklitat River arises at about 5000 feet elevation and flows just over 95 miles to the Columbia River at Lyle. Major tributaries include Swale Creek, Little Klickitat River, Outlet Creek, Big Muddy Creek, W. Fk Klickitat River, and Diamond Fork.

Climate can be characterized as a hybrid of that found on the east and west sides of the Cascades, owing to the watershed's position at the head of the Columbia Gorge. A climatic gradient exists from the northwest (cooler, wetter) to the southeast (warmer, drier), portions of the watershed. Summers are typically hot and dry (avg. temp. 55^{o}F - 70^{o}F) and winters are cold and wet (avg. temp. 25^{o}F - 37^{o}F). Precipitation ranges from 140 inches on Mount Adams to 15 inches on the southeastern plateau with 75-85%

falling between November and May; a persistent snowpack contributes runoff to some tributaries and the mainstem far into the drier portion of the year.

The watershed is approximately equally divided between Klickitat and Yakima counties. The Yakima Indian Nation reservation occupies the northern 56% of the watershed. Approximately 90% of the non-reservation land is privately held. Approximately 75% of the land is forested, and is mostly managed for commercial timber production and grazing. Most of the remaining 25% is agricultural land (orchards, hay, and pasture); of this, about 25% is irrigated. Total population in the watershed is 16000; urban development is limited to the city of Goldendale (pop. 3500) and the unincorporated towns of Lyle, Klickitat, and Glenwood and, combined with rural residential use, occupies less than one-half of one percent of the watershed.

Species and Stock Description

Six stocks comprising three species of anadramous salmon utilize the Klickitat watershed. All stocks, except possibly winter steelhead, have been supplemented or even sustained by the Klickitat Hatchery, operated since 1952 by the Washington Department of Fish and Wildlife:

Spring chinook are known to have existed historically in the watershed. The stock is of mixed (native and non-native) origin, and is sustained by both hatchery and wild production. The stock is identified as depressed in the WDF/WDW Salmon and Steelhead Stock Inventory (SASSI), due to chronically low adult returns. This stock spawns almost exclusively in the mainstem; rearing is assumed to occur in all the areas where spawning occurs and near the mouths of the larger tributaries.

Early run (tule) fall chinook were not found in the watershed prior to 1946, due to the impassability of Lyle Falls at the time the adults returned to spawn. Passage improvements in the early fifties and hatchery production from 1952-1986 have resulted in establishment of a naturally spawning population. The stock is of mixed (native and non-native) origin, and is sustained by both hatchery and natural production. The stock is identified as healthy in the WDF/WDW Salmon and Steelhead Stock Inventory (SASSI). This stock spawns almost exclusively in the mainstem; rearing is assumed to occur in all the areas where spawning occurs.

Late run (upriver bright) fall chinook were discovered in the watershed in 1989. The stock is of non-native origin, and is sustained by entirely by natural production of hatchery strays. The stock is identified as healthy in the WDF/WDW Salmon and Steelhead Stock Inventory (SASSI). This stock spawns almost exclusively in the mainstem; rearing is assumed to occur in all the areas where spawning occurs.

Coho are not believed to be native to most of the Klickitat watershed, due to the impassability of Lyle Falls at the time the adults returned to spawn. The stock is of non-native origin, and is sustained by entirely by hatchery production. The stock is identified

as depressed in the WDF/WDW Salmon and Steelhead Stock Inventory (SASSI), due to chronically low adult returns. Limited information on spawning distribution is available; spawning has been observed in the mainstem as far as the hatchery, as well as the lower reaches of a number of tributaries; rearing is assumed to occur in all the areas where spawning occurs.

Summer steelhead are known to have existed historically in the watershed. The stock is of native origin, and is sustained by natural production. The stock status is unknown in the WDF/WDW Salmon and Steelhead Stock Inventory (SASSI), due to limited information. This stock is also part of the Mid-Columbia Evolutionarily Significant Unit (ESU), which has been listed as "threatened" under the Endangered Species Act. This stock is spawns throughout the mainstem, as well as in the lower reaches of most tributaries; rearing is assumed to occur in all the areas where spawning occurs.

Winter steelhead are suspected to occur in the watershed, based on observations of bright steelhead observed in late winter and early spring catches. The stock is of native origin, and is sustained by natural production. The stock status is unknown in the Salmon and Steelhead Stock Inventory (SASSI), due to limited information. This stock is also part of the Mid-Columbia Evolutionarily Significant Unit (ESU), which has been listed as "threatened" under the Endangered Species Act. No information on spawning distribution is available; it is believed that this stock spawns in the lower mainstem, perhaps as far as Castile Falls (RM 64.2). Rearing is assumed to occur in all the areas where spawning occurs.

Access

Lack of access to potential habitat due to the presence of natural barriers to migration has been identified in previous reports as a major limitation of the production potential of the watershed. Over most of its length, the Klickitat River has carved deep, steep-walled canyons into Columbia River basalt flows, resulting in impassable or marginally passable falls and cascades where the river encounters more resistant bedrock, and restricted access to suitable habitat in many tributaries, where impassably high gradients occur close to the tributary confluence with the mainstem.

Key limiting habitat factors include:

* poor design and operation of the fishway/tunnel complex at Castile Falls;
* difficult passage at Lyle Falls;
* difficult passage at Little Klickitat Falls;
* restoration of Lower Snyder Creek;

* inaccessible or partially accessible habitat due to numerous road culvert barriers throughout the watershed.

Information needs include:

* a comprehensive culvert inventory and survey of inaccessible habitat.

Floodplains/Wetlands/Riparian Areas

Development of floodplains and wetlands is naturally limited over a large portion of the watershed; deeply incised canyons with narrow valley floors comprise most of the mainstem, as well as substantial portion of most fish bearing tributaries. On the plateau, unrestrained channels are able to develop natural meander patterns and create floodplains and wetlands.

No evaluation of wetlands is available at this time. Wetlands development appears to be constrained by topography in some portions of the watershed and climate (i.e. low rain-fall) in other portions.

Riparian condition is influenced by geology and topography. In the canyon reaches described above, riparian areas appear to be more or less intact; on the plateau reaches where agricultural and urban land uses occur, the riparian forest has been almost entirely removed, or is in a condition such that only minimal amounts of necessary ecological functions can be provided.

Key limiting habitat factors include:

* degraded riparian habitat along the Little Klickitat River (above RM 12);

* degraded riparian habitat along Swale Creek (RM 0 to RM 14);

* degraded meadow and riparian habitat along the mainstem Klickitat River above Castile Falls (RM 77 to RM 85).

Information needs include:

* Assessment of floodplain connectivity and riparian condition, with a focus on plateau reaches.

Sediment

Sedimentation and turbidity in the watershed are viewed as a significant factor limiting habitat productivity in the watershed. The primary source of this sediment is naturally generated glacial silt from the eastern flanks of Mount Adams, which is delivered to the mainstem Klickitat by snowmelt runoff via Big Muddy and Little Muddy Creeks. Other sources of excess sediment, both natural and anthropogenic, are likely to be miniscule at the watershed scale compared to this source, though they may have adverse effects on fish and fish habitat at the local scale.

No systematic, watershed evaluation of sediment sources and impacts has been conducted in the watershed. Generally speaking, land-use related sediment sources in this watershed occur as a result of forest practices (e.g. harvesting, skidding, and road building across or adjacent to a stream), agricultural practices (e.g. rill irrigation, streamside grazing), or residential or commercial construction (land clearing and excavation in the vicinity of a stream). Problem areas identified include damaged meadows and riparian areas along the mainstem above Castile Falls and eroded/compacted streambanks and riparian areas along portions of the Little Klickitat River (above RM 12) and Swale Creek (RM 0 to RM 14).

Key limiting habitat factors include:

* naturally-generated glacial sediments entering the Klickitat River at RM 53.8 and RM 63.1;

* damaged meadows and eroded/compacted streambanks along the Klickitat River (RM 77 to RM 85);

* eroded/compacted streambanks along the Little Klickitat River (above RM 12);

* eroded/compacted streambanks along Swale Creek (RM 0 to RM 14);

* chronic erosion from stream-adjacent logging roads (various locations in the watershed).

Information needs include:

***** a watershed-scale evaluation on sediment sources and sinks, including relative magnitudes and habitat impacts.

Water Quantity/Quality

No flow regulation occurs within the watershed; all flows in the watershed occur within a natural flow regimen, with the exception of portions of Outlet Creek, Hellroaring

Creek, Swale Creek, and the Little Klickitat River, where diversions for water supply and irrigation occur. An instream flow study conducted in 1991 identified Swale Creek and the Little Klickitat River and a number if its tributaries as having insufficient flows to support fish populations (anadramous and resident); these streams have been placed on the state "water quality impaired" (303d) list for instream flows. It is not known to what extent insufficient flows are land use related.

Identified water quality problems include high temperature in Butler Creek, Swale Creek, and the Little Klickitat River; these streams have been placed on the state "water quality impaired" (303d) list for temperature. Temperatures exceeding state water quality standards have been recorded in these streams primarily during low flow periods during the summer months; it is presumed that these exceedences are attributable to lack of stream shading due to degraded or non-existant riparian areas and low summer flows.

Key limiting habitat factors include:

* lack of riparian shading along Swale Creek from RM 0 to RM 14;

* lack of riparian shading along the Little Klickitat River above RM 12.

Key information needs include:

* in streams identified as "water quality impaired" for instream flows: an evaluation of the relative contribution of natural and land use factors (particularly water withdrawals) on low flows;

* in streams identified as "water quality impaired" for temperature: coordination of stream temperature data collection and riparian inventory to identify reaches which are most responsive to riparian zone planting and restoration.